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AUTHOR Sanders, Jimy M.
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ABSTRACT

The priority attached to inner-city student desegregation has often become diminished with the onset of mandatory faculty desegregation. Consequently, students tend to be substantially more segregated than teachers in urban schools. Faculties in predominantly minority schools typically have higher turnover and less experience than faculties in other schools. The effect of these circumstances on the academic achievement of elementary school students was examined in the Houston (Texas) Independent School District, the largest district in the nation initially affected by court-ordered desegregation. Achievement among black students was found to be negatively related to the extent to which their teachers were racially isolated.(Degree of racial isolation was measured by the proportion of same race students assigned to respective teachers.) In addition, achievement was lower for black students assigned teachers who had been transferred involuntarily for faculty desegregation purposes. Achievement of black, Hispanic, and white students was positively associated with teaching experience and negatively related to faculty turnover. These findings suggest that poorly planned desegregation policies can have undesirable consequences. (Author/GC)

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FACULTY DESEGREGATION AND STUDENT ACHIEVEMENT*

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Jimy M. Sanders

Department of Sociology

University of California, Santa Barbara

UD 022 618

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ABSTRACT

The priority attached to inner city student desegregation has often become diminished with the onset of mandatory faculty desegregation. Consequently, students tend to be substantially more segregated than teachers in urban schools. Moreover, faculties in predominately minority schools typically have higher turnover and less experience than faculties in other schools. In the largest district initially placed under court-ordered faculty desegregation, we examined how these circumstances may have influenced academic attainment among elementary students. Achievement among black students was negatively related to the extent to which their teachers were racially isolated. Also, achievement was lower for black students assigned teachers who were involuntarily transferred for faculty desegregation purposes. The achievement of black, Hispanic and white students was positively associated with teaching experience and negatively related to faculty turnover. These findings suggest that poorly planned desegregation policies can have undesirable consequences.

FACULTY DESEGREGATION AND STUDENT ACHIEVEMENT

A myriad of social and legal complications has long limited the effectiveness of urban school desegregation planning (e.g., Armor, 1980; Coleman, Kelly and Moore, 1975; Farley, 1976; Pettigrew and Green, 1976; Rossell, 1978). One contributing factor has been white resistance to desegregation. Such opposition appears to be positively related to the proportion of minorities in a district (Clotfelter, 1976; Munford, 1973; Stinchcombe et al., 1969). Hence, the realities of urban demography suggest that the desegregation of inner city schools may proceed with less than even deliberate speed for the foreseeable future. Furthermore, commitment to desegregation within all three governmental branches appears to have grown more reserved over the past several years (Bolner and Shanley, 1974; Brown, 1979; Orfield, 1978a; van Geel, 1980). For example, conjointed court rulings (e.g., Singleton versus Jackson Municipal Separate School District, Fifth Circuit: 1965; 1967 and 1969) intended to facilitate various dimensions of school desegregation have been applied unevenly. An important product of these phenomena has been that faculty desegregation is often more fully carried out than is student desegregation.

Cross-race faculty transferring on an unprecedented scale was instituted within a year following the 1969 Alexander vs. Holmes County decision (Weitz, 1970). Although the utility of large scale faculty desegregation was untested, the issue had previously stimulated considerable controversy (Noland, 1969). Many of the original misgivings expressed continue to draw attention. For example, some worry that the desegregation of faculties in

districts characterized by extensive student segregation may limit academic development. Purportedly, the placement of teachers in racially isolated environments may reduce classroom social cohesion and teacher resources that are crucial to the educational process.

Faculty turnover in minority schools reinforces concern over how various desegregation strategies may influence student outcomes. When faculty desegregation became mandatory, the youngest and least experienced teachers were usually the first to be placed in cross-race settings (Bruno and Doscher, 1981; Jackson, 1981). Subsequently, faculty turnover in predominantly minority schools has often increased several times over. Teachers leaving these schools are usually young and white, rarely having more than 2 or 3 years of experience (Dworkin, 1980). Ironically, more inexperienced white teachers must then be hired to maintain mandated racial quotas. Prior to faculty desegregation, minority school faculties tended to exemplify stability. This pattern partially reflected the use of teaching as a vehicle for intergenerational social mobility (Betz and Garland, 1974; Braxton and Bullock III, 1972).

A vast literature (e.g., Adenika and Berry, 1976; Beady and Hansell, 1981; Brookover and Erickson, 1975; Brophy and Good, 1974; Cornbleth and Korth, 1980; Harvey and Slatin, 1975; Herriott and St. John, 1966; Larkin, 1975; Rist, 1970; Rothbart, Dalfen and Barrett, 1971) indicates that substantial differences in the socialization experiences and expectations of teachers and students can contribute to a deterioration of classroom morale and communication. In consequence, student achievement sometimes

appears to be negatively affected. Moreover, many teachers express deep dissatisfaction in regard to involuntary placement in unfamiliar social settings (Scaffer and Scaffer, 1970; Yee, 1968). Further, relatively inexperienced teachers may tend to be less effective than more experienced teachers in facilitating student learning (Hanushek, 1972; Levin, 1970; Murnane, 1975). The literature also suggests that faculty turnover has a destabilizing influence on faculty relations and student-teacher interaction to the point of lowering achievement (Burkhead, Fox, and Holland, 1967; Katzman, 1971; Leeson, 1968).

HYPOTHESES

Based on the issues delineated above, a model was specified that considered student achievement as a function of the net influences of: 1) the extent to which teachers were racially isolated; 2) teacher experience; 3) involuntary teacher transfers; 4) faculty turnover; and 5) student achievement. Hypothesized relationships 1, 3, and 4 were expected to be negative while 2 and 5 were expected to be positive. Modeling prior achievement provided a proxy control for non-specified variables. This strategy is useful in limiting estimation bias to a substantively non-critical level (Alexander, Pallas and Cook, 1981; Boardman and Murnane, 1979; Bohrnstedt, 1969).

DATA

The Houston Independent School District was the largest district initially affected by court-ordered faculty desegregation. Data from the district have been used to examine the hypotheses posited above. Both the student-teacher assignment demographics and the legal impetus of faculty desegregation policy

in Houston are characteristic of large city school districts (Bruno and Doscher, 1981; Clark, 1972; Jackson, 1981; Ravitch, 1981). Therefore, the study should be relevant to a cross-section of urban school districts.

Information was gathered from a simple random sample of 20 percent (N = 8,203) of all fourth, fifth and sixth grade students during the 1976-77 school year and a smaller representative sample of district teachers (for details see Dworkin, 1980). Combining both samples rendered 1,494 cases of student-teacher matches. However, 25 students assigned to 8 Hispanic teachers and 15 students assigned to 5 Asian teachers were not considered because of the limited number of such cases. For the same reason, 7 students of various ethnic groups (e.g., American native, Vietnamese) were dropped from the analysis. Therefore, the sample included 1,447 fourth (520), fifth (461) and sixth (466) grade students and their 1976-77 teachers. The unit of analysis was the individual student. The number of students matched with each teacher ranged from 1 to 9. One hundred eighty-one teachers were black and 262 were white. Five hundred eighty-three students were black, 305 were Hispanic and 559 were white. The sample closely approximated district characteristics although white students and teachers were slightly over represented. Also, achievement among fifth graders was somewhat above the district average. Table 1 summarizes the most pertinent comparisons.

[Place Table 1 about here.]

MEASUREMENT

Achievement growth was measured with the Iowa Tests of Basic Skills (ITBS) at the completion of the 1976-77 (POST-TEST) and

1975-76 (PRE-TEST) academic years. Subject areas included: arithmetic; language; reading; vocabulary; and work study. The 5 tests represented observed indicators of a common latent factor.

The degree to which teachers were racially isolated (ISOLATED) was measured as the proportion of non-black (for students assigned black teachers) or non-white (for students assigned white teachers) students attending teachers' schools.

Teaching experience was measured as a spline function (Poirier, 1976). LESS-EXP represented classroom experience among first, second and third year teachers. The variable was coded as actual years of prior experience up to 2, beyond that, all teachers were coded 3. MORE-EXP reflected classroom experience for teachers with 3 or more years of previous experience. Teachers with less than 3 years of experience were coded 0 and remaining teachers were coded a value equal to actual years minus 2. Only full time teaching experience in accredited public or private schools was considered.

Faculty TURNOVER was measured as the proportion of 1976-77 teachers in a school who were not assigned there during the 1975-76 school year.

TRANSFER was measured as a binary variable coded 1 when a teacher had been involuntarily transferred from a school attended predominately (> 90%) by students of the teacher's race to a school where more than 50 percent of the students were of a different race. Non-transferred teachers served as a comparative group throughout the analysis.

In order to compare the consistency of relationships across teacher race, main and interaction terms involving teacher race

and each of the exogenous variables were also considered. Teacher race (T-BLACK) was measured as a binary variable coded 1 for black teachers. The interactions included: T-B-ISOLATED; T-B-LESS-EXP; T-B-MORE-EXP; T-B-TURNOVER; and T-B-TRANSFER.

[Place Table 2 about here.]

FINDINGS

The structural equations represented in Table 3 were estimated with LISREL IV (Joreskog and Sorbom, 1979).[1] Factor loadings and error correlations are reported in appendix form.[2] Based on a chi-square goodness-of-fit test, the theoretical model fit the observed data for each of 3 student groups. Therefore, statistically significant parameter estimates were scrutinized for substantive meaning and are discussed below.

[Place Table 3 about here.]

Only the achievement of black students appears to have been influenced by teacher racial isolation. Black students assigned non-transferred highly isolated teachers tended to gain 4.27 months less achievement than black students of non-transferred teachers who were not isolated. On theoretical grounds, this suggests that classroom communication and cooperation between black students and non-transferred teachers declined as teacher racial isolation increased. The formation of productive educational climates seems to have suffered as a result. The relationship was independent of teacher race. This seems to suggest that black students may have been particularly vulnerable in socially uneasy environments. While evidence is sparse, Bickel, Qualls and O'Neill (1980) and Sizemore (1981) do provide tentative support for this possibility.

The effect of teaching experience on student achievement also varied by race. Among black students assigned non-transferred black or white teachers with little experience, one year increases in experience led to increases of .7 months in achievement. Also, Hispanic students gained 2.07 months and white students gained .32 (1.67 - 1.35) months in achievement for each year of experience held by relatively inexperienced black non-transferred teachers. Thus, additional classroom experience for non-transferred black teachers early in their careers did seem to make them more effective with all students. Among white teachers, this relationship held only for black students. Unexpectedly, 1 year increases in classroom experience among non-transferred white teachers having little experience were associated with decreases in achievement of 1.35 months for white students. This may have reflected teachers lowering their expectations of students as years of experience were accumulated (Beady and Hansell, 1981). However, pending further evidence, our field experiences and much of the literature lead us to cautiously weigh this finding.

Only the achievement of Hispanic students was statistically related to experience among non-transferred teachers with 3 or more years of experience. However, even this effect was substantively trivial. Therefore, supplementary years in the classroom did not appear to influence the effectiveness of non-transferred teachers with several years of experience.

Faculty turnover appears to have been negatively related to student achievement growth. The relationship was not differentiated by teacher race. Black, Hispanic and white students of non-transferred teachers in schools with no faculty

turnover would have averaged 7.01, 14.69 and 8.60 months respectively more achievement than black, Hispanic and white students attending schools with no returning teachers. However, these estimates were inflated due to a statistical projection. Faculty turnover between the 1975-76 and 1976-77 academic years in Houston elementary schools ranged from 0 to 52 percent. This is more representative of faculty turnover in public schools than a range of 100 percent. Furthermore, faculty turnover tends to be highest in predominately black schools. Black students in the sample attended schools with faculty turnover reaching 52 percent while Hispanic and white students attended schools with faculty turnover reaching 33 and 32 percent respectively. Therefore, a more realistic interpretation is that black, Hispanic and white students attending schools with the least faculty turnover averaged about 3.50 (7.01/2), 4.89 (14.69/3) and 2.86 (8.60/3) months more achievement than black, Hispanic and white students at schools with the greatest faculty turnover.

Whether student achievement was influenced differently by transferred and non-transferred teachers was also considered. Black students assigned transferred teachers of either race gained 1.9 months less in achievement than black students with non-transferred teachers. No further net differences between students of transferred and non-transferred teachers were uncovered. Again, the achievement of black students seems to have been particularly vulnerable to circumstances that may tend to disturb social cohesion.

These results enrich the findings previously reported. For Hispanic and white students, the estimated effects of teaching

experience and faculty turnover likely hold for transferred as well as non-transferred teachers. Among black students, the positive effect of classroom experience for non-transferred teachers may not hold for transferred teachers.

The assumption that student achievement was affected differently by teachers of different racial groups was also tested. This was done by estimating the models with all main and interaction variables involving teacher race removed. Based on a chi-square goodness-of-fit test, teacher race should not be excluded from the analysis. Appropriately, the main effect of teacher race was controlled in conjunction with the tests for interaction (Blalock, 1955; 1957). Black students tended to gain 5.81 months less in achievement when assigned black rather than white teachers. Once more the achievement of black students appears to have been negatively affected by factors irrelevant to the achievement of other students.

It is important to note that the ending 1975-76 ITBS composite scores of black students were .5 (fourth grade), 1.9 (fifth grade) and 4.0 (sixth grade) months lower for those assigned black rather than white teachers for the 1976-77 school year. The fifth and sixth grade discrepancies were significant beyond the .001 level. Therefore, the relationship between teacher race and achievement gain may have primarily reflected a familiar fanning pattern wherein initial gaps between high and low achieving students tend to increase over time. However, this explanation is not entirely satisfactory because black teachers also tended to be assigned lower achieving white and Hispanic students.

Not surprisingly, 1975-76 achievement contributed a strong positive effect on the dependent variable. An increase of one year in prior achievement led to roughly a one year increase in 1976-77 achievement for all students. Although this finding did not directly enrich the discussion, it was necessary to control for the relationship. Estimation of the remaining relationships was made more reliable as a result.

SUMMARY AND DISCUSSION

It has been shown that school and classroom conditions brought about, to a significant extent, by a faculty desegregation policy appear to directly affect student achievement. The total substantive impact of these factors is of unquestionable significance.

Faculty desegregation may have the potential to contribute to the just allocation of social and academic resources to all students. Considering our findings however, it seems unlikely that faculty desegregation can be imposed under conditions like those in Houston during the 1970's without being somewhat detrimental to student academic outcomes. The achievement of each racial group of students seems to have been affected by ramifications of the policy. Achievement among black students was negatively related to the extent to which their teachers were racially isolated. Also, achievement was lower for black students assigned teachers who were involuntarily transferred for faculty desegregation purposes. The achievement of all students was positively associated with teaching experience and negatively related to faculty turnover.

Clearly, the implementation of faculty desegregation in Houston has left much to be desired. Consequently, alternative strategies for the application of faculty desegregation should be considered. Elsewhere, experienced teachers have temporarily been transferred in an effort to mediate faculty turnover and to maintain experienced faculties in minority schools (Culbertson, 1974). However, desegregation policies that do nothing more than set racial quotas are not sufficient to insure a reversal of traditionally unequal schooling patterns (Orfield, 1973b; Rist, 1979). As Willie (1976:19) reminds us, "...desegregation can go forth in a constitutional way without facilitating quality education. How to prevent separation of method from purpose in education is a problem in need of serious study." In Houston, desegregation method appears to have sometimes run contrary to educational purpose.

NOTES

1. Variables distinguishing grade levels were initially included in the model. After preliminary analyses failed to uncovered grade differences (substantive or statistical), the variables were dropped.

2. The strategy used for specifying disturbance parameters is described by Sorbom (1975). While the first order derivative matrix generated by LISREL IV is not standardized, the data considered by Sorbom result in coefficients that are almost standardized because of presumably similar variances and identical metrics among observed indicators. This is also true of our data. Because of the similar nature of the tests, substantively (i.e., measuring academic achievement) and operationally (i.e., pencil and paper tests), all statistically significant error correlations were modeled.

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Table 1: District and sample comparisons.

Variable	District		Sample	
1975-76 I.T.B.S. composite: (means and standard deviations)	$\bar{X}$	σ	$\bar{X}$	σ
third grade	3.6,	.99	3.67	1.00
fourth grade	4.52	1.15	4.68	1.16
fifth grade	5.32	1.30	5.36	1.29
1976-77 I.T.B.S. composite: (means and standard deviations)	$\bar{X}$	σ	$\bar{X}$	σ
fourth grade	4.54	1.15	4.52	1.16
fifth grade	5.39	1.32	5.61	1.34
sixth grade	6.31	1.44	6.29	1.42
Student ethnicity: (percentages)	%		%	
black	.42		.40	
Hispanic	.22		.21	
white	.36		.39	
Teacher ethnicity: (percentages)	%		%	
black	.41		.41	
white	.55		.59	

Table 2: Descriptive statistics of observed variables.

Variable	Black students				Hispanic students				White students			
	$\bar{X}$	σ	Min	Max	$\bar{X}$	σ	Min	Max	$\bar{X}$	σ	Min	Max
VOCA77	4.48	1.33	1.3	9.3	4.74	1.41	1.5	8.8	6.24	1.46	2.0	9.7
READ77	4.53	1.49	1.1	9.4	4.68	1.43	1.5	8.8	6.29	1.48	1.9	9.9
LANG77	4.94	1.46	2.1	9.7	5.35	1.43	1.8	9.6	6.75	1.47	2.9	9.9
WKST77	4.81	1.18	2.5	9.2	5.10	1.36	2.4	9.5	6.49	1.43	3.0	9.8
MATH77	4.79	1.28	1.8	9.1	5.09	1.34	2.2	9.2	6.42	1.44	2.4	9.8
VOCA76	3.77	1.33	1.1	8.9	3.86	1.32	1.4	8.5	5.22	1.32	1.0	8.9
READ76	3.73	1.24	1.3	8.0	3.88	1.26	1.4	7.6	5.26	1.35	1.4	9.1
LANG76	4.27	1.32	1.6	8.7	4.54	1.32	1.8	8.3	5.74	1.31	2.0	8.8
WKST76	3.93	1.11	1.4	8.2	4.18	1.20	1.6	7.9	5.40	1.35	1.9	8.7
MATH76	3.95	1.20	1.5	8.0	4.21	1.21	1.8	7.7	5.33	1.31	1.8	8.8
T-BLACK	.49	.50	0	1	.36	.48	0	1	.32	.46	0	1
ISOLATED	.53	.43	0	1	.79	.24	.01	1	.50	.34	.01	1
B-T-ISOLATED	.07	.19	0	.95	.31	.43	0	1	.28	.42	0	1
LESS-EXP	2.56	.87	0	3	2.70	.72	0	3	2.87	.51	0	3
B-T-LESS-EXP	1.29	1.43	0	3	.94	1.35	0	3	.91	1.36	0	3
MORE-EXP	8.70	8.82	0	39	9.88	8.70	0	35	11.91	8.12	0	38
B-T-MORE-EXP	5.18	8.31	0	39	3.67	7.12	0	31	3.07	6.20	0	31
TURNOVER	.17	.09	0	.52	.14	.06	0	.33	.10	.06	0	.32
B-T-TURNOVER	.08	.10	0	.52	.05	.08	0	.33	.03	.06	0	.32
TRANSFER	.13	.34	0	1	.21	.41	0	1	.13	.34	0	1
B-T-TRANSFER	.02	.15	0	1	.10	.31	0	1	.11	.31	0	1
N	583				305				559			

Table 3: Structural equation maximum likelihood estimates.

Variable	Black students			Hispanic students			White students		
	b	SE	β	b	SE	β	b	SE	β
ISOLATED	- .427*	.226	-.16	- .157	.178	-.03	.129	.106	.04
B-T-ISOLATED	.219	.279	.04	- .348	.305	-.12	- .359	.229	-.12
LESS-EXP	.070*	.041	.05	.051	.067	.03	- .135**	.058	-.05
B-T-LESS-EXP	.103	.065	.13	.207**	.097	.23	.167**	.083	.18
MORE-EXP	.004	.005	.03	- .011**	.005	-.08	- .003	.033	-.02
B-T-MORE-EXP	- .010	.007	-.08	.004	.009	.03	- .008	.006	-.04
TURNOVER	- .701*	.383	-.06	-1.469*	.751	-.08	- .860**	.380	-.04
B-T-TURNOVER	.603	.572	.06	1.047	1.064	.07	.669	.639	.03
TRANSFER	- .190**	.091	-.06	- .138	.113	-.05	- .099	.143	-.03
B-T-TRANSFER	.270	.207	.04	.118	.164	.03	.230	.160	.06
T-BLACK	- .581**	.269	-.25	- .416	.371	-.16	- .314	.323	-.11
PRE-TEST	.894**	.040	.88	.967**	.052	.90	1.120**	.037	.96

* Significant at .05 one-tail test.
** Significant at .05 two-tail test.

Goodness-of-fit	.076	.275	.304
Degrees of freedom	110	109	105
χ^2	131.8	117.3	111.9
R^2	.825	.869	.914

Appendix A: Disturbance correlations and factor loadings for black student model.

	ε01	ε02	ε03	ε04	ε05	ε06	ε07	ε08	ε09	ε10
ε01: VOCA77	1.00									
ε02: READ77	--	1.00								
ε03: LANG77	--	--	1.00							
ε04: WKST77	--	--	.04	1.00						
ε05: MATH77	--	--	--	.10	1.00					
ε06: VOCA76	--	.05	--	--	--	1.00				
ε07: READ76	.05	--	--	--	--	--	1.00			
ε08: LANG76	--	--	.12	.03	--	--	--	1.00		
ε09: WKST76	--	--	--	.09	.05	--	--	--	1.00	
ε10: MATH76	--	--	--	.06	.11	-.03	--	--	.06	1.00

Factor Loadings

Variable	PRE-TEST		POST-TEST	
	Metric	Standardized	Metric	Standardized
VOCABULARY	1.000*	.85	1.000*	.86
READING	.945	.86	1.074	.82
LANGUAGE	1.036	.88	1.129	.88
WORK STUDY	.856	.87	.861	.83
ARITHMETIC	.928	.87	.939	.84

* Reference parameter fixed at 1.000.

Appendix B: Disturbance correlations and factor loadings for Hispanic student model.

	ε01	ε02	ε03	ε04	ε05	ε06	ε07	ε08	ε09	ε10
ε01: VOCA77	1.00									
ε02: READ77	.04	1.00								
ε03: LANG77	--	--	1.00							
ε04: WKST77	--	--	--	1.00						
ε05: MATH77	--	--	--	.07	1.00					
ε06: VOCA76	--	.06	--	--	--	1.00				
ε07: READ76	--	--	--	-.04	-.04	--	1.00			
ε08: LANG76	--	--	.11	--	--	--	--	1.00		
ε09: WKST76	--	--	--	.03	--	-.05	-.08	--	1.00	
ε10: MATH76	--	--	--	.06	.06	-.04	-.07	--	--	1.00

Factor Loadings

Variable	PRE-TEST		POST-TEST	
	Metric	Standardized	Metric	Standardized
VOCABULARY	1.000*	.88	1.000*	.88
READING	1.006	.92	.995	.86
LANGUAGE	.998	.87	1.028	.89
WORK STUDY	.996	.96	.982	.90
ARITHMETIC	.954	.91	.932	.86

*Reference parameter fixed at 1.000.

Appendix C: Disturbance correlations and factor loadings for white student model.

	ε01	ε02	ε03	ε04	ε05	ε06	ε07	ε08	ε09	ε10
ε01: VOCA77	1.00									
ε02: READ77	.06	1.00								
ε03: LANG77	--	--	1.00							
ε04: WKST77	--	-.03	--	1.00						
ε05: MATH77	-.02	--	--	--	1.00					
ε06: VOCA76	.08	.16	--	--	--	1.00				
ε07: READ76	.08	.08	--	--	--	.07	1.00			
ε08: LANG76	--	.03	.12	--	--	.03	--	1.00		
ε09: WKST76	--	--	-.02	.02	--	--	--	--	1.00	
ε10: MATH76	-.03	--	--	--	.05	-.03	-.04	--	--	1.00

Factor Loadings

Variable	PRE-TEST		POST-TEST	
	Metric	Standardized	Metric	Standardized
VOCABULARY	1.000*	.84	1.000*	.89
READING	1.074	.89	.962	.85
LANGUAGE	1.044	.89	1.001	.89
WORK STUDY	1.150	.95	1.041	.95
ARITHMETIC	1.108	.94	1.041	.94

*Reference parameter fixed at 1.000.